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**TM 11-700**



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TM 11-700  
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WAR DEPARTMENT

WASHINGTON, February 2, 1942.

TECHNICAL MANUAL  
No. 11-700Prepared under direction of the  
Chief Signal Officer

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## SECTION I

## DESCRIPTION

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**1. Purpose.**—Interphone equipments RC-53 and RC-53-A are six-station, intravehicular communication systems for use in the medium tank M3. In addition to providing voice communication between all members of the vehicular crew, the interphone equipment enables the radio operator and tank commander to retain partial control of the vehicular radio apparatus for intervehicular and base-station voice communication.

**2. Power.**—*a. Input* (interphone equipment RC-53).—The primary source of power required to operate interphone equipment RC-53 is the 12-volt, 168 ampere-hour, 8-hour rate, vehicular storage battery (not an interphone component). Normal storage battery current consumption of interphone equipment RC-53 is 3.0 to 3.5 amperes.

*b. Input* (interphone equipment RC-53-A).—The primary source of power required to operate interphone equipment RC-53-A is the 24-volt, 168 ampere-hour, 8-hour rate, vehicular storage battery

(not an interphone component). Normal storage battery current consumption of interphone equipment RC-53-A is 1.5 to 2.0 amperes.

*c. Output.*—The interphone amplifiers for both interphone equipment RC-53 and interphone equipment RC-53-A have a nominal output rating of 2 watts.

### 3. List of components showing weights.

Quantity		Article	Unit weight (pounds)
RC-53	RC-53-A		
2	2	TM 11-700, technical manual for interphone equipments RC-53 and RC-53-A	
4		Brush, HV, for dynamotor DM-25-( ); spare	
4		Brush, LV, for dynamotor DM-25-( ); spare	
	4	Brush, HV, for dynamotor DM-45-( ); spare	
	4	Brush, LV, for dynamotor DM-45-( ); spare	
1	1	Control box BC-422	2.0
1	1	Control box BC-449	1.7
6	6	Cord CD-307-A (48" long) (Note 1)	
4	4	Cord CD-318; 3 in use, 1 spare (Note 2)	
1	1	Cord CD-416 (Note 2)	
1	1	Cord CO-279 (Note 3)	
4	4	Fuse FU-21-A; spare	
6	6	Headset HS-18 (Note 1)	
1		Interphone amplifier BC-367	18.5
	1	Interphone amplifier BC-667	18.5
1 set	1 set	Interconnecting conduit, wire and clamps	10.0
1		Jack box BC-378	3.2
1	1	Jack box BC-379	1.3
1	1	Jack box BC-448	1.7
	1	Jack box BC-678	3.2
4		Lamp LM-33; spare	
	4	Lamp LM-43; spare	
5	5	Microphone T-30-A; 4 in use; 1 spare (Note 2)	.3
1	1	Terminal block TM-183	1.0
6	6	Tube VT-107 (RCA 6V6 or equal); 2 in use, 4 spare	.1

NOTES: 1. Headsets P-19 may be substituted for headsets HS-18. When this is done cords CD-307-A are not used.

2. Microphones T-17 may be substituted for microphones T-30-A. When this is done cords CD-318 and 416 are not used.

3. Cord, CO-279, is issued for use with radio sets SCR-508-( ), SCR-528-( ), and SCR-538-( ) only.

**4. Mechanical features.**—The major components which are all housed in sheet iron boxes  $\frac{5}{64}$ -inch thick, are mounted directly to the body of the vehicle. All of the control equipment except interphone amplifier BC-367 and interphone amplifier BC-667 is permanently mounted and wired to the terminal strips in each box. Both interphone amplifiers BC-367 and BC-667 have rubber shock mountings and are of "plug-in" type for convenience in servicing. All units are interconnected by wires which are drawn through flexible metallic conduit and soldered to the terminal strips.

*a. Interphone amplifier BC-367 or BC-667 (fig. 1).*—This unit consists of a panel and tube chassis assembly fitting into a sheet steel

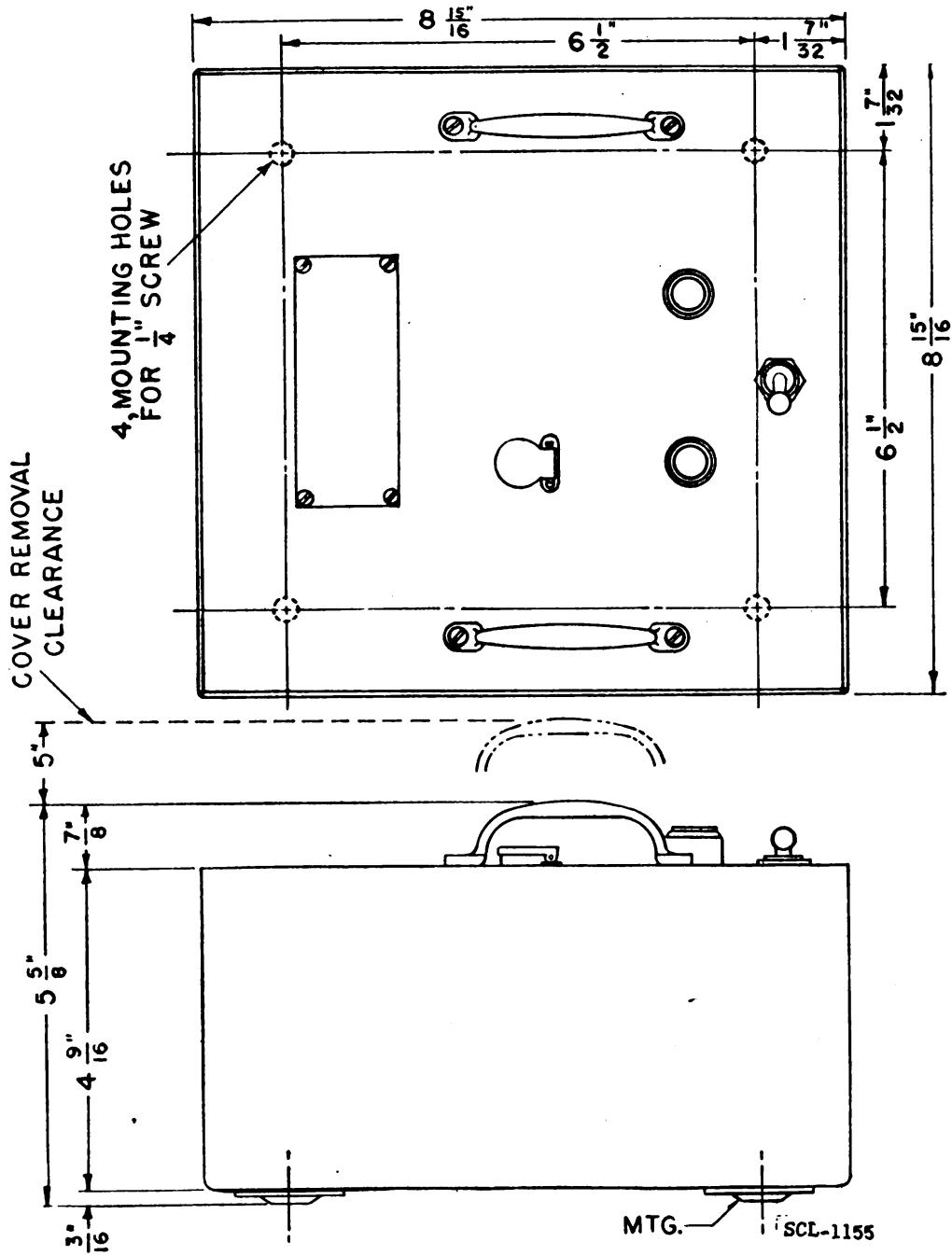


FIGURE 1.—Interphone amplifier BC-367 or BC-667.

box. The entire unit can be removed from the box as electrical connections are made by the use of plugs and jacks. Two guide angles on the sides of the box and chassis assure proper alignment of the

plugs when entering the jacks. In the box which is approximately  $8\frac{3}{4}$  inches long  $\times 8\frac{3}{4}$  inches wide  $\times 4\frac{1}{2}$  inches deep, is mounted a ter-

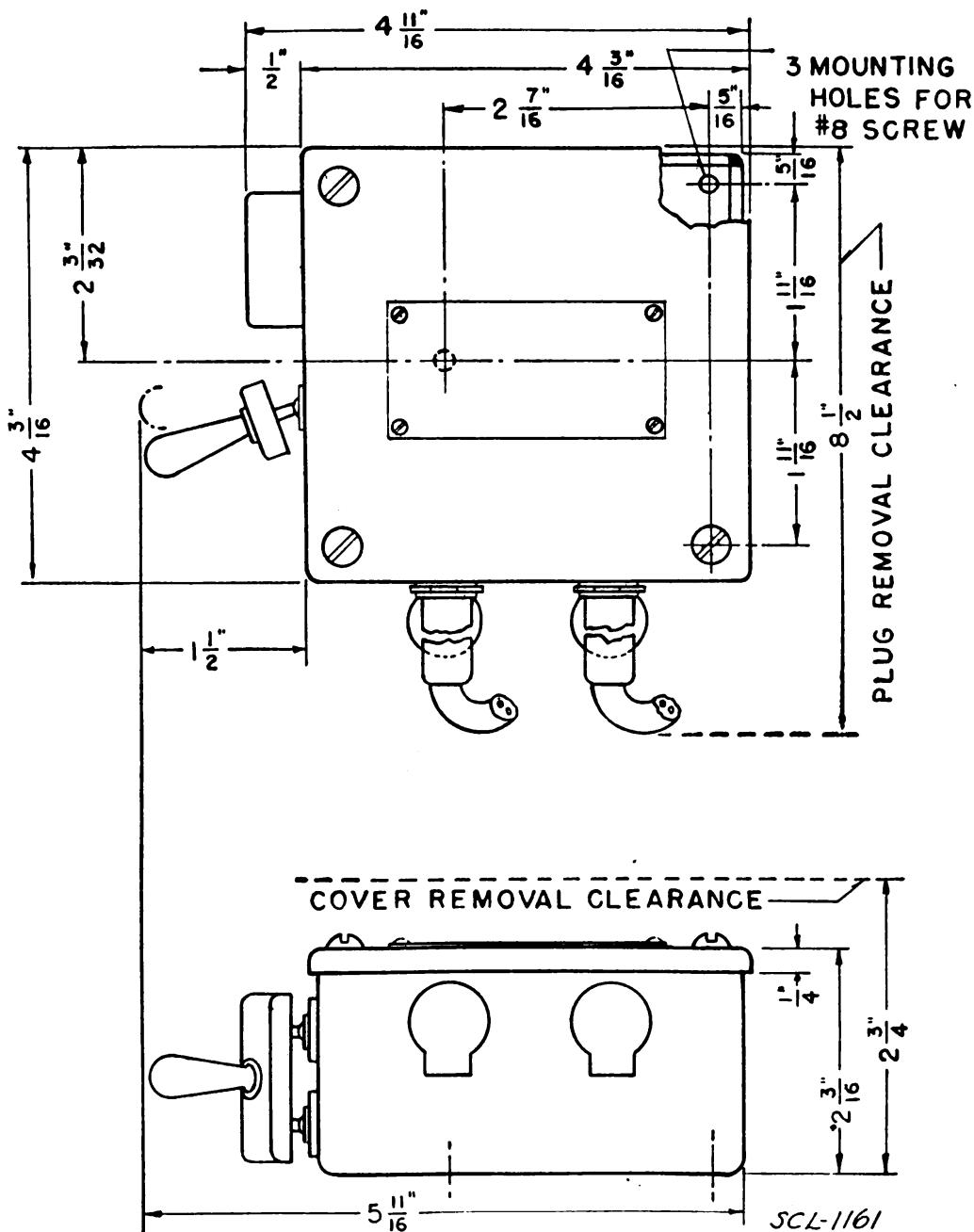


FIGURE 2.—Control box BC-422.

rninal block consisting of 14 lugs where the external interconnecting wires of the system terminate. The back contains four rubber shock-mountings by means of which the amplifier is mounted on the vehicle.

The panel and chassis assembly consists of a tube shelf riveted to a sheet steel front panel approximately 8 $\frac{3}{4}$  inches long x 8 $\frac{3}{4}$  inches wide.

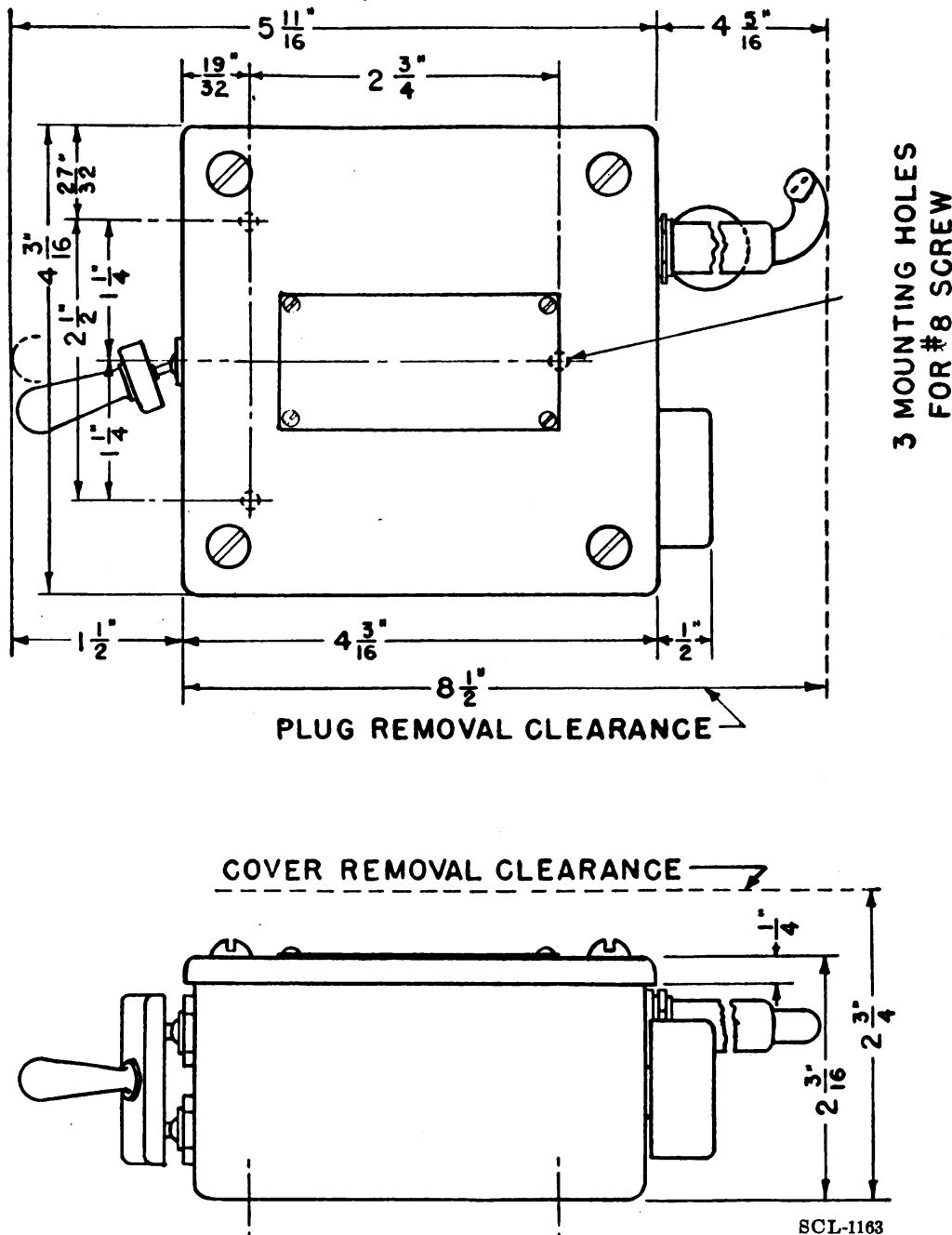


FIGURE 3.—Control box BC-449.

The front panel provides the mounting of the dynamotor and its associated filter, an off-on switch, two fuse posts and an opening for adjustment of a volume control with a screw driver. On the tube

shelf are mounted two beam amplifier tubes VT-107, one input transformer, one output transformer, one oscillator transformer, and two capacitors. The volume control is mounted on a bracket supported

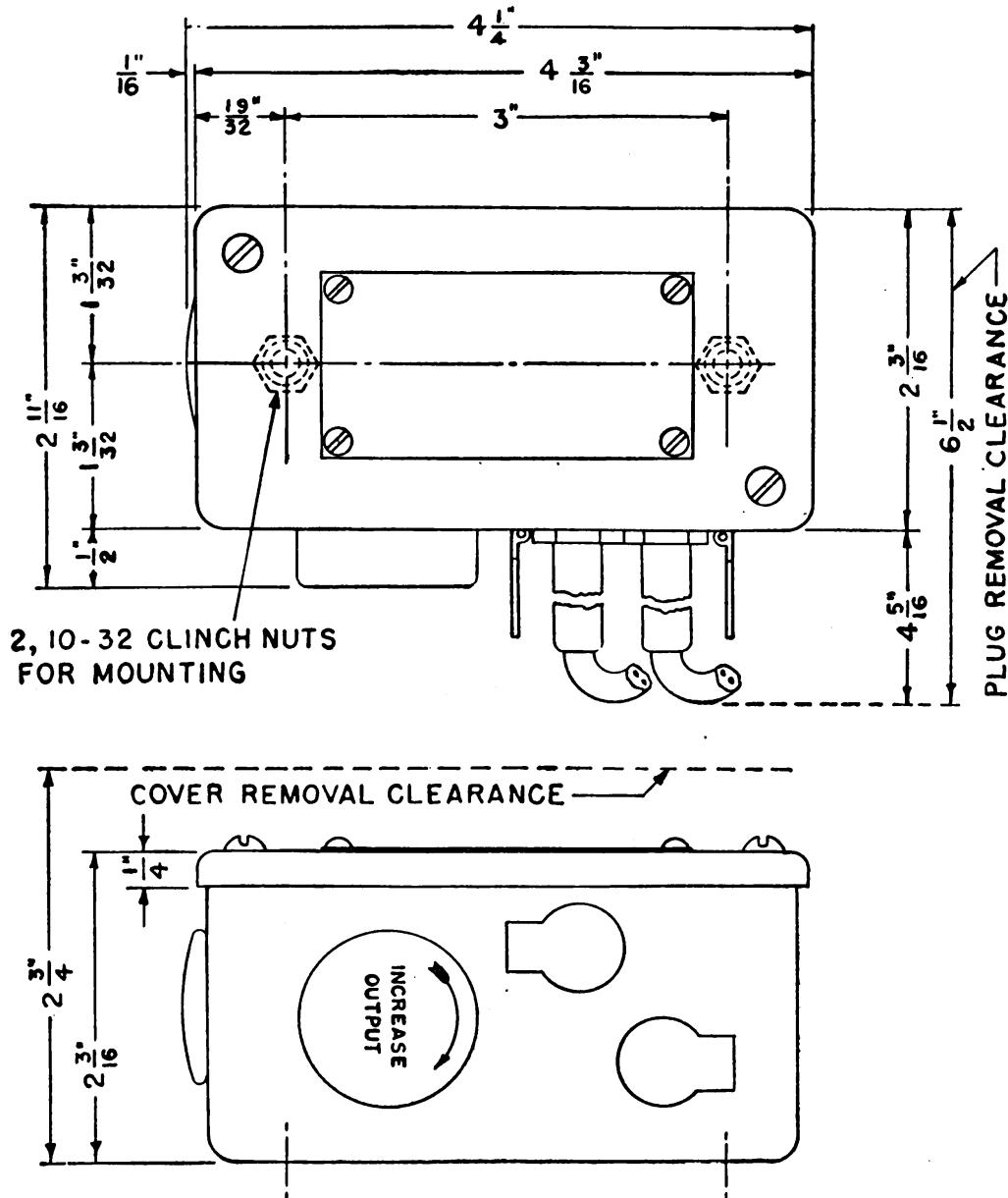
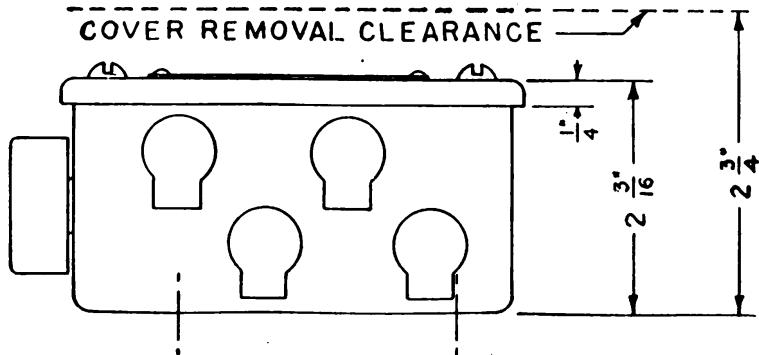
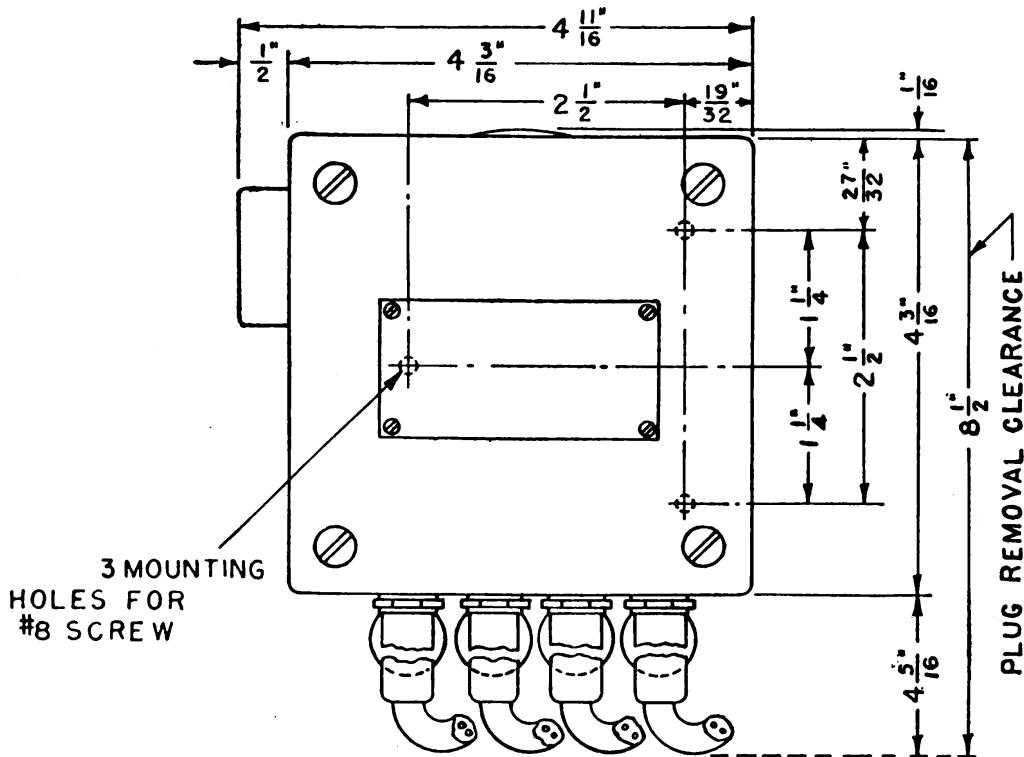


FIGURE 4.—Jack box BC-379.

SCL-1160

from the tube shelf and consists of a special knob which may be adjusted through the panel with a screw driver. A spring provides friction on the knob to prevent turning under vibration. Mounted on brackets and supported from the tube shelf is a terminal board located in the back of the box.

*b. Control box BC-422 (radio operator) (fig. 2).*—This control box consists of a sheet steel box approximately 4 inches long x 4 inches



SCL-1162

FIGURE 5.—Jack box BC-448.

wide x 2 inches deep, and a cover. In it are mounted: one 10,000-ohm, wire-wound potentiometer for volume control; one INTERPHONE-RADIO transfer switch consisting of two double-pole, double-throw, toggle switches operated together by a common switch handle; two

jacks, one for a headset, one for a microphone; and one 16-point terminal block which connects the unit to the rest of the system.

c. *Control box BC-449 (tank commander, right sponson gunner)*

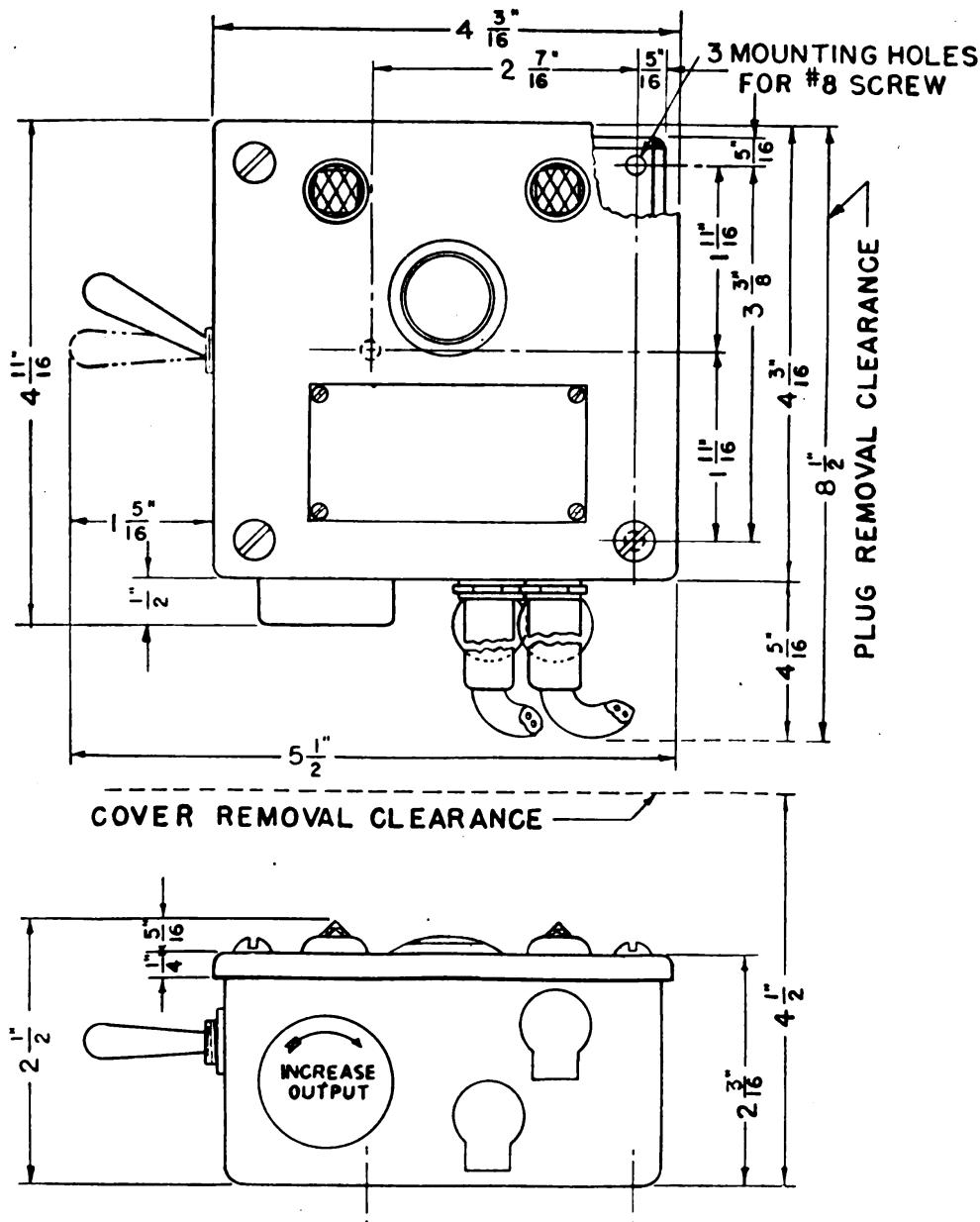


FIGURE 6.—Jack box BC-378 or BC-678.

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(fig. 3).—This control box consists of a sheet steel box approximately 4 inches long x 4 inches wide x 2 inches deep and a cover. In it are mounted: one 10,000-ohm wire-wound potentiometer for volume control; one INTERPHONE-RADIO transfer switch consisting of two

double-pole, double-throw, toggle switches operated together by a common switch handle; one headset jack, and one 16-point terminal block which connects the unit to the rest of the system.

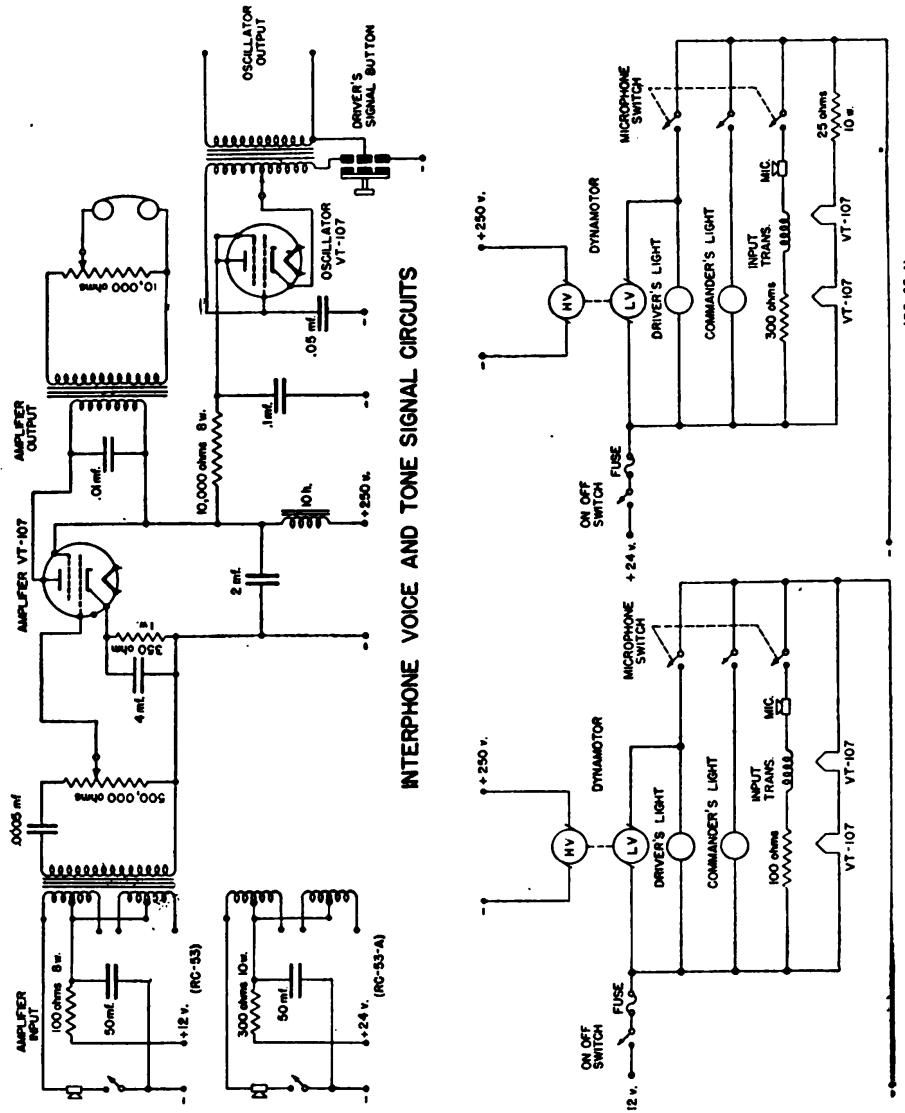
*d. Jack box BC-379* (right sponson loader) (fig. 4).—This unit consists of a sheet steel box approximately 4 inches long x 2 inches wide x 2 inches deep, and a cover. On this box are mounted: one 10,000-ohm wire-wound potentiometer for volume control; two jacks, one for a headset, and one (not wired) for a microphone. In the box is mounted a 6-point terminal block which connects the unit to the rest of the system.

*e. Jack box BC-448* (tank commander, turret gunner) (fig. 5).—This unit consists of a sheet steel box approximately 4 inches long x 4 inches wide x 2 inches deep, and a cover. On the side of this box are mounted four jacks, two for headsets and two for microphones, and one 10,000-ohm wire-wound potentiometer. In the box is mounted a 6-point terminal block which connects the unit to the rest of the system.

*f. Jack box BC-378 or BC-678* (driver) (fig. 6).—This unit consists of a sheet steel box approximately 4 inches long x 4 inches wide x 2 inches deep, and a cover. In it are mounted: one 10,000-ohm wire wound potentiometer for volume control; one double-pole, single-throw toggle switch for the driver's microphone; two jacks, one for headset, one for microphone; one push-button signal switch; two indicating lamps, one red and one green; and one 12-point terminal block which connects the unit to the rest of the system.

**5. Electrical features.**—*a. Interphone amplifier BC-367 or BC-667.*—(1) This unit contains two separate circuits, oscillator and amplifier. (See fig. 7.) The oscillator circuit is used to generate an audio signal of approximately 600 cycles to provide a means for the driver to signal when he wishes to speak to anyone on the radio side of the system. This audio voltage is impressed across the input of the second audio if radio receiver BC-312-( ) is used, or across the output if radio receiver BC-683-( ), BC-603-( ), or BC-652 is used. The amplifier is of the transformer-coupled type and provides a maximum output of over 2 watts. The rising characteristic from 100 cycles to 2,500 cycles (attenuation at lower frequencies) tends to compensate for the poor high-frequency response of microphone T-30-A and prevent excessive noise pick-up. The input transformer consists of a two-winding primary with each winding center-tapped, and a single-wound secondary. The audio frequency voltage after being stepped up by the input transformer is applied through a potentiometer

volume control to the grid of the amplifier tube VT-107. The output of this tube appears across the secondary of the output transformer. Various output impedances of this transformer can be obtained by use of the proper tap. The amplifier is shipped with an output impedance of 2,500 ohms in use. In interphone amplifier BC-367 the d-c



microphone current is obtained from the car-battery source through a 100-ohm dropping resistor. In interphone amplifier BC-667 the d-c microphone current is obtained from the car-battery source through a 300-ohm dropping resistor. A 50  $\mu$ f, 25-volt, electrolytic capacitor bypasses the a-c component of the microphone current through the dropping resistor.

FIGURE 7.—Interphone amplifier BC-367, or BC-667, schematic circuit.

(2) In the oscillator circuit, the grid is inductively coupled to the plate and tuned by a  $0.05 \mu f$  capacitor across the grid and ground. Tube VT-107 is a beam power amplifier with screen and plate connected together to form a triode. The oscillator transformer has a secondary winding which is connected to the output of the radio receiver.

(3) In interphone amplifier BC-367 the plate and screen voltage for both the amplifier and oscillator circuits are obtained by the use of a dynamotor (12 volts input to 250 volts output) mounted on the front panel of the interphone amplifier chassis. The filaments of tubes VT-107 are connected in series across the battery supply.

(4) In interphone amplifier BC-667 the plate and screen voltage for both the amplifier and oscillator circuits are obtained by the use of a 24 volts input to 250 volts output dynamotor mounted on the front panel of the interphone amplifier chassis. The filaments of tubes VT-107 are connected in series across the battery supply through a 25-ohm dropping resistor.

(5) The negative battery terminal of the dynamotor is kept above ground potential and used as the dynamotor control lead. Depressing the microphone switch connects it to ground, thus starting the dynamotor. A filter unit, consisting of a 10-henry choke coil with a  $2 \mu f$  paper capacitor across the load side, is mounted on the front panel of the interphone amplifier chassis and provides d-c voltage for the tube plates and screens.

*b. Control box BC-422 (radio operator).*—This box is wired so that the headset and microphone used by the radio operator can be switched to either the radio system or the interphone system by means of a 4-pole, double-throw switch. A potentiometer controls the output from the radio or interphone amplifier.

*c. Control box BC-449 (tank commander, right sponson gunner).*—This box is wired with a headphone jack for the right sponson gunner. The tank commander operates a 4-pole, double-throw, INTERPHONE-RADIO switch, providing control over the headphone and microphone jacks in jack box BC-448 (tank commander, turret gunner). This switch when turned to INTERPHONE also lights the green indicating lamp on jack box BC-378 (driver) when interphone equipment RC-53 is used, or jack box BC-678 (driver) when interphone equipment RC-53-A is used. A potentiometer controls the output from the radio or interphone amplifier.

*d. Jack box BC-379 (right sponson loader).*—This box provides jacks for insertion of a headset and a microphone for the right sponson

loader. The potentiometer mounted on the side of the box is connected directly across the interphone amplifier output.

*e. Jack box BC-448* (tank commander, turret gunner).—This box provides means for insertion of headsets and microphone for the tank commander and turret gunner. The potentiometers are connected directly across the output of the interphone amplifier. Operation of this box is controlled by the INTERPHONE-RADIO switch on control box BC-449 (tank commander, right sponson gunner).

*f. Jack box BC-378 or BC-678* (driver).—This box is wired so that turning the double-pole, single-throw switch to ON starts the dynamotor and connects the microphone to the input of interphone amplifier BC-367 for interphone equipment RC-53, or interphone amplifier BC-667 for interphone equipment RC-53-A. The red indicating lamp is wired to the dynamotor control circuit. This lamp lights when the microphone switch is turned ON or when any other member of the crew depresses his microphone button. The lamp when lighted serves as a warning to the driver to prevent him from leaving the microphones switch ON for long periods of time. The green indicating lamp marked COMMANDER lights whenever the tank commander throws his switch on control box BC-449 to INTERPHONE. The push-button signal switch is wired so that pushing the button starts the dynamotor in the interphone amplifier and grounds the cathode circuit of the oscillator tube VT-107, causing an audio signal to be set up in the radio output circuit.

## SECTION II

### EMPLOYMENT

	Paragraph
Installation-----	6
Operation-----	7

**6. Installation.**—*a. Drilling data.*—Medium tank M3 comes with all the necessary mounting holes and spacers.

NOTE: If radio sets SCR-245-M or SCR-193-F are to be used, refer to radio installation information for medium tank M3 (radio sets SCR-193-F, SCR-210-H, SCR-245-M) for relocation of interphone amplifier bracket to eliminate interference with dynamotor unit PE-55 or BD-77.

*b. Clamps, screws, etc.*—All clamps, screws, nuts, and lock washers needed to install the various components in this vehicle are listed on figure 8. Care should be taken to use the exact screw specified and all screws, clamps, etc., left over should be placed in a cloth bag and secured to a bracket. It is important to have the holes in the vehicle

and the brackets line up with the drilling in the interphone equipment. Be sure to use lock washers where stop nuts are not called for. *Do*

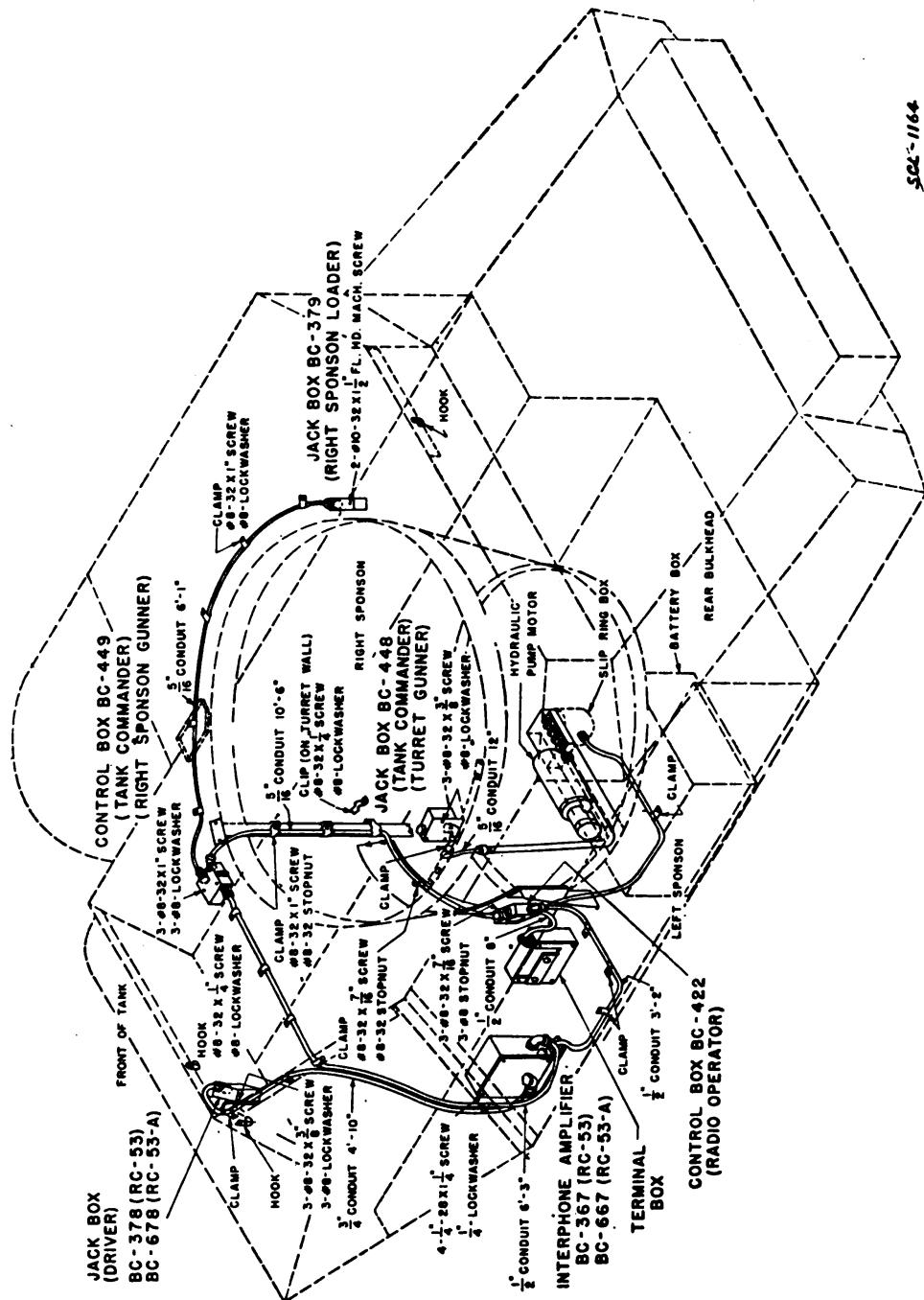


FIGURE 8.—Installation of telephone equipment RC-53 or RC-53-A in medium tank M3.

*not change hole line-up on the interphone parts unless absolutely necessary.*

*c. Initial procedure.— (1) Interphone equipment RC-53 or*

*RC-53-A.*—Comes completely wired for installation. The requisite mounting brackets and spacers are supplied as part of medium tank M3. See note under paragraph 6a.

(2) *Interphone amplifier BC-367 or BC-667.*—The amplifier assembly is mounted on the under side of the cover. Remove the cover assembly from the box by removing the eight screws which fasten the cover and pull it straight out. Install two tubes VT-107 on the amplifier assembly and one spare tube VT-107 in the amplifier box.

(3) *Jack box BC-378 or BC-678 (driver).*—Remove the four cover screws and the cover.

(4) *Control box BC-422 (radio operator).*—Remove the four cover screws and the cover.

(5) *Control box BC-449 (tank commander, right sponson gunner).*—Remove the four cover screws and the cover.

(6) *Jack box BC-448 (tank commander, turret gunner).*—Remove the four cover screws and the cover. Unsolder the terminal lugs at the end of the four wires extending from the conduit.

*d. Details of installation (fig. 8).*

Part	Place	Method and material
Interphone amplifier BC-367 or BC-667.	On bracket in left sponson.	Secure the amplifier box in place at the holes provided, with four machine screws ( $\frac{1}{4}$ "-28 x $1\frac{1}{4}$ ") and lock washers.
Jack box BC-378 or BC-678 (driver).	On bracket near upper left corner of hull.	Secure in place with three machine screws (#8-32 x $\frac{3}{8}$ ") and lock washers.
Control box BC-422 (radio operator).	On turret guard rim near left sponson.	Secure in place with three machine screws (#8-32 x $\frac{7}{16}$ ") and stop nuts.
Control box BC-449 (tank commander, right sponson gunner).	On ceiling near roof support post.	Secure in place with three machine screws (#8-32 x 1"), spacers provided, and lock washers.
Jack box BC-379 (right sponson loader).	On ceiling at rear near turret basket.	Insert two screws, provided with spacers, through top hull of tank and mount box.
Jack box BC-448 (tank commander, turret gunner).	On bracket in turret basket above entrance.	Secure in place with three machine screws (#8-32 x $\frac{3}{8}$ ") and lock washers.
Microphone T-30-A.	To be strapped comfortably around throat above the larynx.	
Cord CD-318.	Microphone cords for tank commander, radio operator, and turret gunner.	
Cord CD-416.	Microphone cord for driver.	
Headset HS-18.	Installed in crash helmets.	
Cord CD-307-A (48")	Headset cords.	
Cord CO-279.	Jumper cord between radio set and car terminal box.	
Tube VT-107.	3 spares (disposition left to discretion of using arms).	
Lamp LM-33.		

Part	Place	Method and material
Terminal block.....	In car terminal box.....	Secure in place on brackets provided with screws, nuts, etc., in such position that terminal numbers can be easily read. Wire terminals 2 and 4 to power terminals +12 and -12, respectively, in car terminal box for interphone equipment RC-53, or to +24 and -24, respectively, for interphone equipment RC-53-A.

e. *Conduit and wiring* (fig. 9 for interphone equipment RC-53 or fig. 10 for RC-53-A).—(1) The conduits are secured along the walls and ceiling with clamps, screws, etc., provided. Before securing ring type clamps in place on roof support post, wrap a few turns of rubber tape on post to provide a tight fit.

(2) Remove the slip ring box cover, under the turret, by removing the two wing nuts. The open end of the conduit of control box BC-449 is connected to the lower hole in the slip ring box panel by means of the coupling nut. The four numbered terminal lugs are connected to the correspondingly numbered studs in the box.

(3) Remove the hydraulic pump motor and the turret junction box cover in the turret by removing the necessary bolts and screws. Insert a steel wire snake through the end of the solid conduit in the turret junction box. Pull the four wires at the open end of conduit of jack box BC-448 through solid conduit by means of steel wire snake. Resolder lugs as follows: yellow to 1, brown to 2, black to 3, and shield to 4, and connect to correspondingly numbered studs in turret junction box. Terminate the shield of the shielded lead in an eyelet inside the solid conduit and run an insulated ground lead from the shield to ground. Couple the braided conduit to the solid conduit by means of the coupling nut.

(4) Connect the conduit from control box BC-422 to the upper left knock-out hole of the car terminal box by means of the coupling nut. Connect the seven wires with terminal lugs to the correspondingly numbered studs of terminal block TM-183.

(5) When radio set SCR-508-( ), SCR-528-( ), or SCR-538-( ) is used, connect cord CO-279 between radio set and car terminal box. Insert punch-terminal end through front right hole in radio mounting base and connect other end through upper right knock-out hole by means of box connector. Connect terminal lugs to correspondingly numbered studs and clamp the cable in the radio mounting base (al-

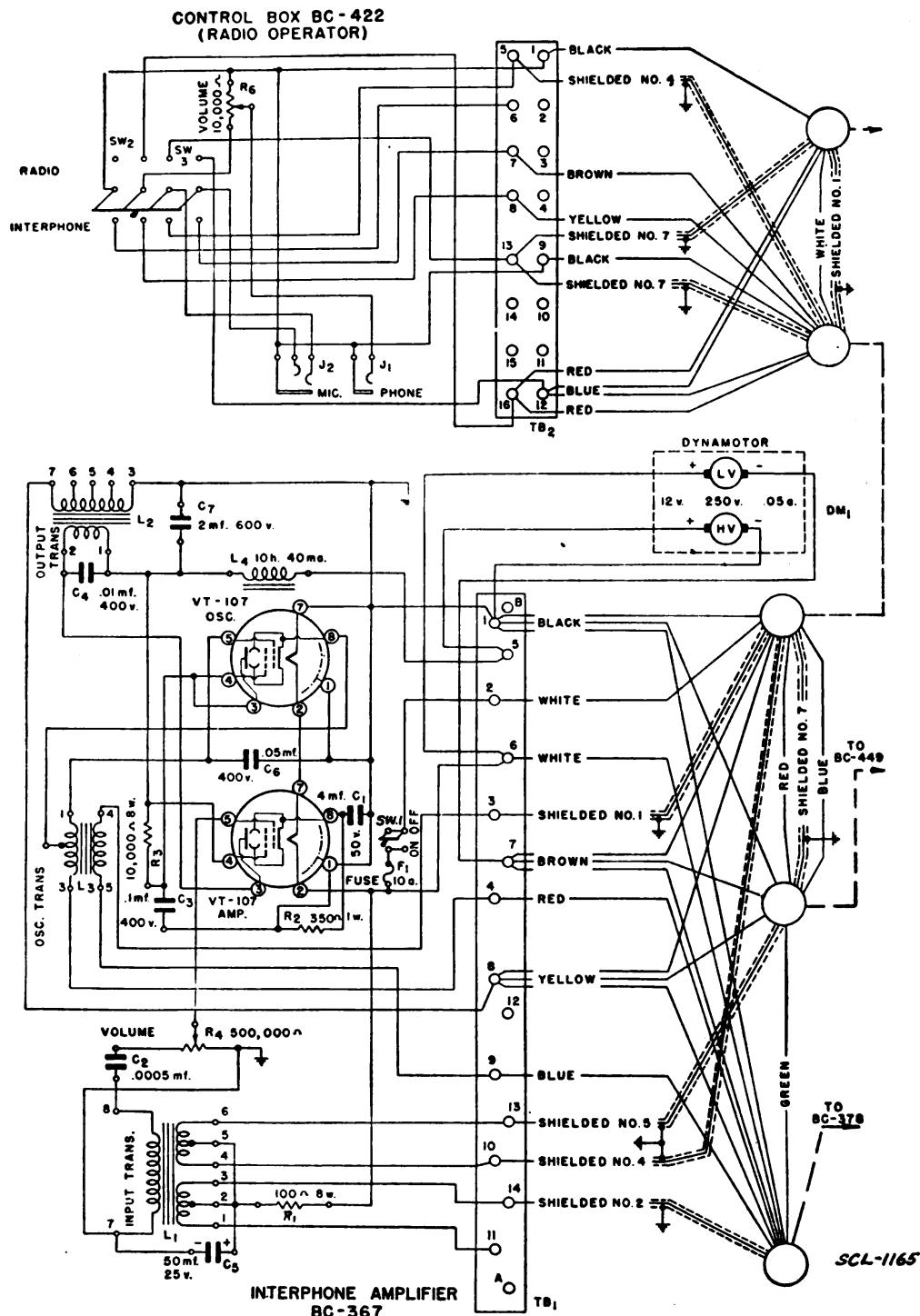


FIGURE 9.—Interphone equipment RC-53, wiring diagram.

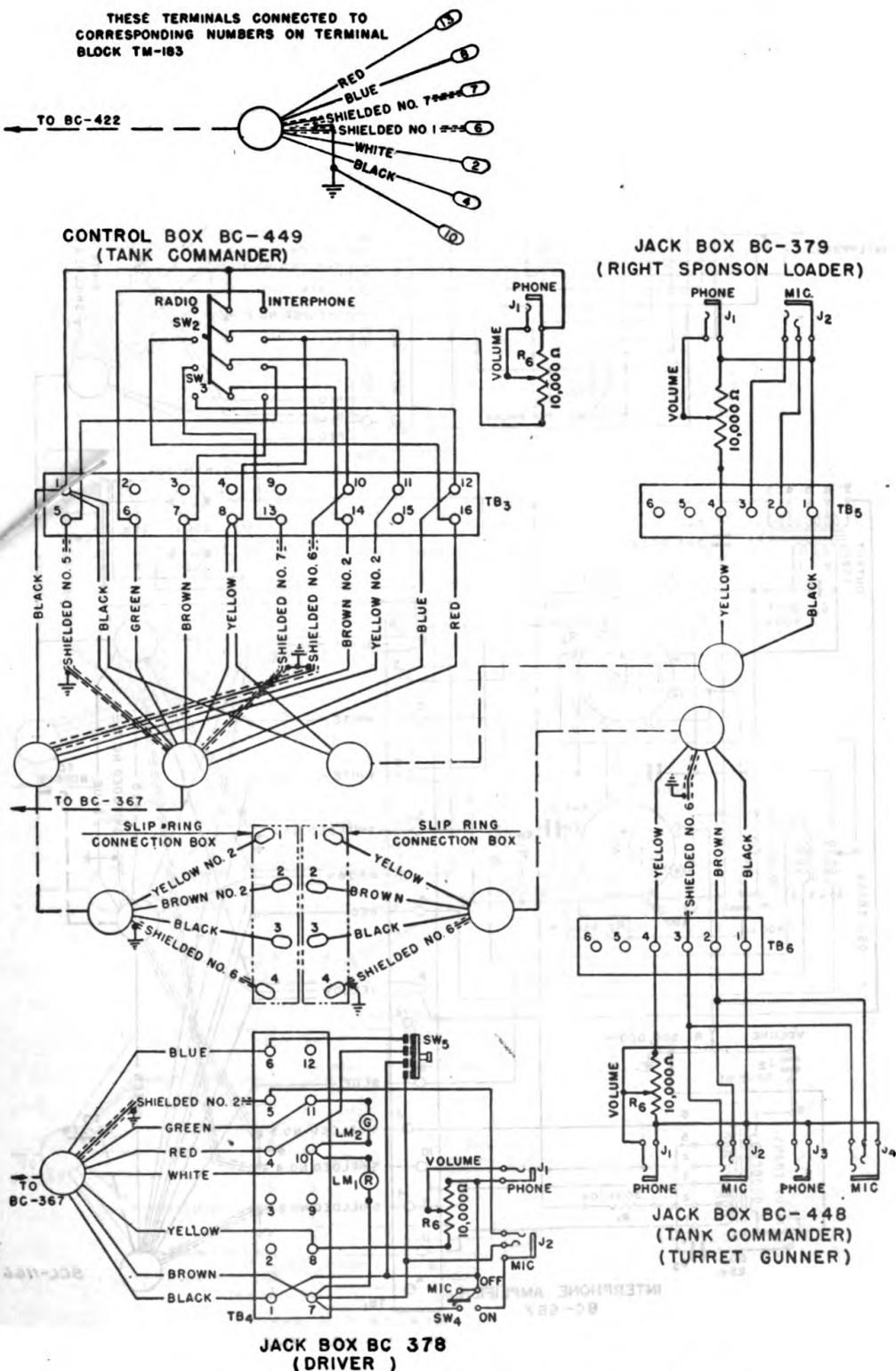


FIGURE 9.—Interphone equipment RC-53, wiring diagram—Continued.

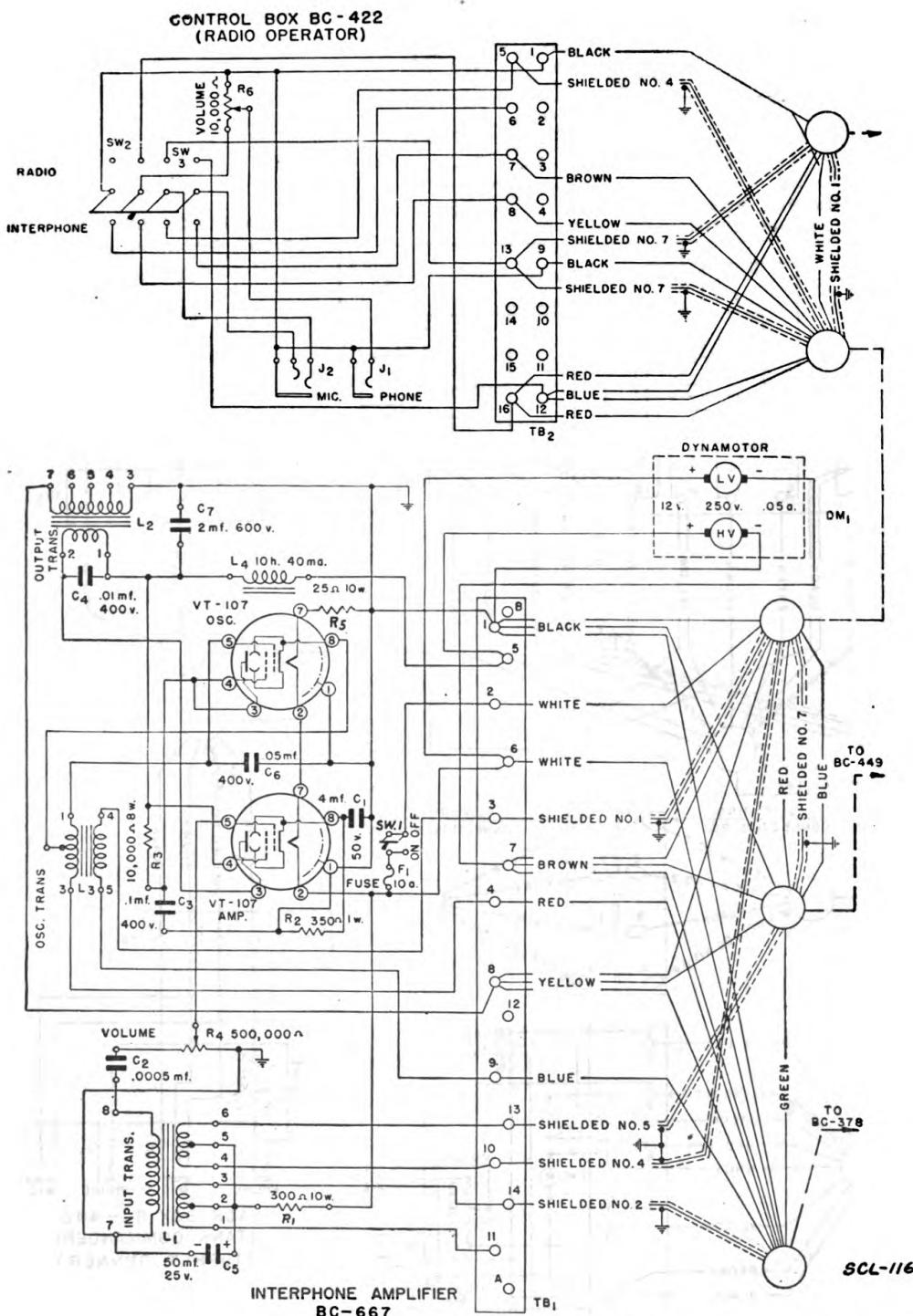
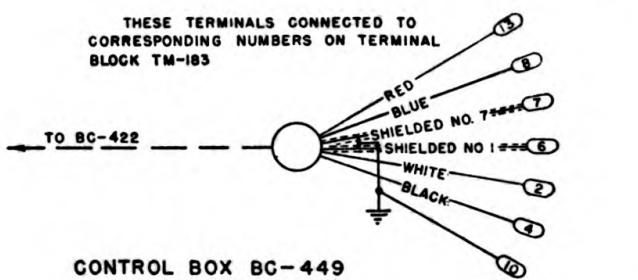
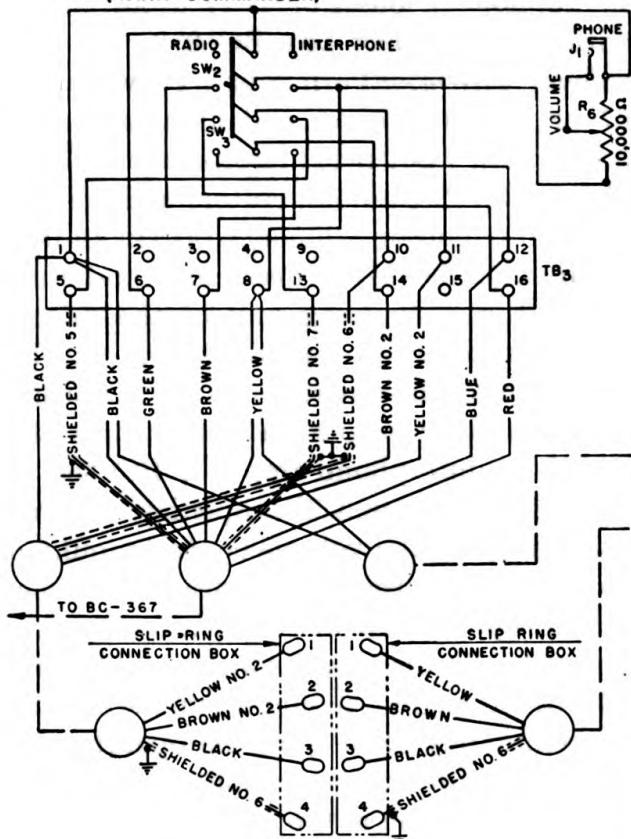


FIGURE 10.—Interphone equipment RC-53-A, wiring diagram.

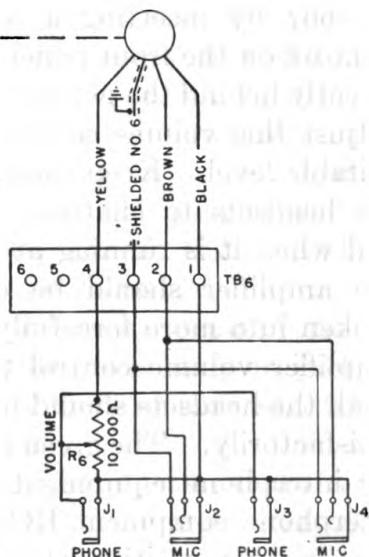
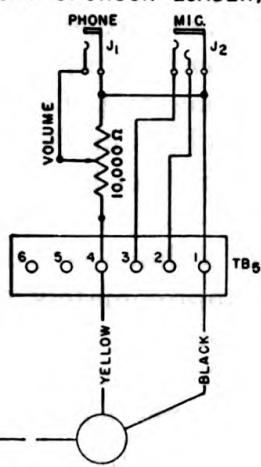
THESE TERMINALS CONNECTED TO  
CORRESPONDING NUMBERS ON TERMINAL  
BLOCK TM-183



**CONTROL BOX BC-449**  
**(TANK COMMANDER)**



JACK BOX BC-379  
(RIGHT SPONSON LOADER)



JACK BOX BC-378  
(DRIVER )

JACK BOX BC-448  
(TANK COMMANDER)  
(TURRET GUNNER)

FIGURE 10.—Interphone equipment RC-53-A, wiring diagram—Continued.

lowing some slack) by means of the screw above the cable entrance.

(6) When radio set SCR-245-M, SCR-193-F, or SCR-210-H is used, connect cord CD-446 between SPEAKER SECOND AUDIO jack of radio receiver BC-312-( ) and a  $\frac{1}{8}$ " knock-out hole on right side of car terminal box. The terminal lugs are connected to the correspondingly numbered studs of terminal block TM-183.

7. **Operation.**—Insert headsets HS-18 or P-19 in all phone jacks of the system. Insert one microphone T-30-A or T-17 in all microphone jacks except the unwired jack in jack box BC-379.

*a. Operation of the interphone system.*—Turn OFF-ON switch of interphone amplifier BC-367 or BC-667 to ON and allow time for tubes to heat up (usually 25 seconds). Set INTERPHONE-RADIO selector switches of both control box BC-422 (radio operator) and control box BC-449 (tank commander, right sponson gunner) to INTERPHONE. Set all volume controls of individual boxes to maximum and turn back approximately one-quarter turn. Pressing any of the microphone buttons should start the dynamotor and a slight hum will be heard in all headsets. Speaking into the microphone in a normal tone of voice should cause the amplifier output to be heard in the headsets. Adjust the volume of the interphone amplifier BC-367 or BC-667 by inserting a screw driver through the opening marked VOLUME on the front panel, and engaging the volume control mounted directly behind the panel. Turning clockwise will increase the volume. Adjust this volume so that the output heard in the headsets is at a suitable level. Keep the volume below that level which would cause the headsets to chatter. The tank engine should then be started and when it is running at approximately 1800 rpm, the operation of the amplifier should be checked. Now the microphone must be spoken into more forcefully. If the volume is too high, readjust the amplifier volume control to a more comfortable level. The output of all the headsets should be checked to see that they are all operating satisfactorily. The green indicating lamp in jack box BC-378 (driver) for interphone equipment RC-53 or jack box BC-678 (driver) for interphone equipment RC-53-A should be lighted. The controls at the driver's position should be tested by turning the microphone switch ON and speaking into microphone T-30-A. The microphone should be adjusted snugly around the neck. Operation of the INTERPHONE-RADIO selector switch in control box BC-449 (tank commander, right sponson gunner) should cause the green indicating lamp in jack box BC-378 (driver) or BC-678 (driver) to light, thus indicating that the tank commander is on the interphone side of the circuit.

*b. Operation of the radio control system.*—The radio operator's INTERPHONE-RADIO selector switch should be turned to RADIO.

(1) *Receiver BC-603-A* (radio sets SCR-508-A, SCR-528-A, SCR-538-A).—Turn radio receiver BC-603-A to ON. With a strong signal being received either from a permanent station or from another tank in the vicinity, adjust the volume control of the radio receiver so that the signal received in both the radio operator's and tank commander's headsets is at a comfortable level. Do not change setting of individual volume controls on controls on control box BC-422 and jack box BC-448 to effect this as they have been properly set for interphone duty.

(2) *Transmitter BC-604-A* (radio sets SCR-508-A, SCR-528-A).—Since radio transmitter BC-604-A has "push-to-talk" microphone control, its OFF-ON switch may be left at ON. Transmitter plate voltages are not applied until either the radio operator's or tank commander's microphone button is pressed.

(3) Depressing the microphone switch and talking modulates the transmitter. Transmitter sidetone should be heard at the radio operator's headset when he is on RADIO. If the tank commander is on RADIO, he also will hear sidetone.

(4) When interphone equipment RC-53 or interphone equipment RC-53-A is used with other radio sets than those previously described, no control of the transmitting elements of these sets is ordinarily provided. However, when the audio output of the receiving elements of these sets is connected to terminal block TM-183 in car terminal box, receiver output can be heard as described in paragraph 7b(1). Interphone operation with radio sets SCR-193-F, SCR-210-H, or SCR-245-M is the same as in paragraph 7b(1) and (2).

*c. Driver's position.*—When the driver wishes to speak to the tank commander, he glances to see whether the green lamp in jack box BC-378 (driver) for interphone equipment RC-53 or jack box BC-678 for interphone equipment RC-53-A is lighted. If so, he then turns the microphone switch to ON and speaks. If the tank commander is not on the interphone system, as indicated by the green lamp being off, the driver presses the signal button. This causes an audio signal in the radio output, heard by the tank commander. If the tank commander desires to interrupt his radio reception, he throws his INTERPHONE-RADIO selector switch to INTERPHONE. The driver by watching the indicating lamp will know that the transfer has been made and he may proceed with his message. The red lamp in jack box BC-378 (driver) for interphone equipment RC-53 or jack box

BC-678 for interphone equipment RC-53-A remains lighted as long as any microphone switch of the interphone system is turned ON. It is not necessary for the driver to turn his microphone switch OFF each time to receive conversation. However, when the entire conversation is completed, the driver's microphone switch should be turned OFF as steady current for long periods is liable to damage the microphone.

*d. General.*—(1) When microphones T-30-A are used, all except the driver's microphone should have control switches. Their operation is identical to that of microphone T-17 except that the switches can be locked ON for short periods of time. When using throat microphones, talk naturally—*do not shout*.

(2) When using microphone T-17, with the tank in motion some noise will enter the amplifier directly through the microphone. Therefore, personnel should be instructed to talk louder into microphone T-17 as the engine speed increases. This increases the signal-to-noise ratio and improves communication.

(3) Headsets HS-18 should be checked occasionally to maintain proper operating condition. A simple way to check this is to listen to each of the headset receivers independently while someone is speaking on the interphone system. Both receivers should be approximately the same strength. If the entire headset response is believed to be weak, it may be compared with that of another headset known to be good. *Care must be exercised in the operation of the interphone system to prevent damage to the headphones. Continued chattering of the headphones caused by excessive volume output will damage them if it happens over a long period of time.*

(4) The filament switch of the interphone amplifier should be turned off at the end of each communication.

### SECTION III

#### MAINTENANCE

	Paragraph
General .....	8
Repair .....	9

**8. General.**—Provided the component units of interphone equipment RC-53 or RC-53-A are properly installed and interconnected, little or no maintenance will be required.

**9. Repair.**—Low volume at any listening position indicates trouble in the amplifier circuit or its associated circuits. Low audio oscillator signal may be caused by a faulty radio set, where the radio is utilized as the oscillator signal amplifier. When difficulty is experi-

enced with the amplifier, the vacuum tubes should be checked first. Usually they will be the cause of the trouble. If the tubes are normal, check the output voltage at the headset jacks with test set I-56, I-56-A, or I-56-C. The measurements are made as follows: Using any standard audio-frequency oscillator apply 0.5-volt, 1000-cycle alternating current at any microphone jack in the system. With all switches in the INTERPHONE position and the system operating, the voltage at any headset jack should be about 75 volts. With the switches in the RADIO position and the driver's signal button depressed, the voltage at either the radio operator's or tank commander's headset jack should be not less than 22 volts. If the trouble is found to be in the amplifier chassis assembly, steps should be taken to replace the defective unit. All cover assemblies for interphone amplifier BC-367 are interchangeable. Cover assemblies of interphone amplifier BC-667 are also interchangeable. Repairs other than replacing defective tubes should not be attempted except at authorized Signal Corps repair shops and radio repair sections.

#### SECTION IV

#### SUPPLEMENTARY DATA AND LIST OF REPLACEABLE PARTS

	Paragraph
Tube VT-107.....	10
List of replaceable parts.....	11
Addresses of manufacturers.....	12

**10. Tube VT-107.**—Typical operating characteristics for tube VT-107 (RCA 6V6 or equal) operating as a pentode:

Heater voltage.....	6.3 volts
Heater current.....	0.45 amperes
Plate voltage (typical operation).....	250 volts
Screen voltage.....	250 volts
Grid bias.....	—12.5 volts
Plate current (zero signal).....	45 milliamperes
Screen current (zero signal).....	4.5 milliamperes
Plate resistance.....	52,000 ohms
Transconductance.....	4,100 microhms

**11. List of replaceable parts.—a. List of parts, interphone equipments RC-53 and RC-53-A.**

Stock No.	Name	Description	Function
	Brush H. V.....	For dynamotor DM-25-( ).....	Spare (RC-53 only).
	Brush L. V.....	For dynamotor DM-25-( ).....	Spare (RC-53 only).
	Brush H. V.....	For dynamotor DM-45-( ).....	Spare (RC-53-A only).
	Brush L. V.....	For dynamotor DM-45-( ).....	Spare (RC-53-A only).
2C663.....	Control box BC-422.....		
2C664.....	Control box BC-449.....		
3E1307A.....	Cord CD-307-A.....	48" long	
3E1318.....	Cord CD-318.....		
3E1416.....	Cord CD-416.....		
3E2279.....	Cord CO-279.....		
3Z1921.....	Fuse FU-21-A.....	10 amp., 25 v., 5 sec. delay.....	Spare.
2B818.....	Headset HS-18.....		
2C1614.....	Interphone amplifier BC-367.....		RC-53 only.
2C1637.....	Interphone amplifier BC-667.....		RC-53-A only.
	Interconnecting conduit, wires, and clamps.....		
2C2218.....	Jack box BC-378.....		RC-53 only.
2C2219.....	Jack box BC-379.....		
	Jack box BC-448.....		
	Jack box BC-678.....		RC-53-A only.
2Z5933.....	Lamp LM-33.....	12-16 v., G 4½, bulb, Mazda.....	Spare, RC-53 only.
2Z5943.....	Lamp LM-43.....	24-28 v., G 4½, bulb, Mazda.....	Spare, RC-53-A only.
2B1630A.....	Microphone T-30-A.....		
	Terminal block TM-183.....		
2T107.....	Tube VT-107.....	(RCA 6V6, or equal).....	

## b. Interphone amplifier BC-367.

Reference No.	Stock No.	Name	Description	Function	Manufacturer (See par. 12)	Manufacturer's Part No.	Drawing Signal C
C <sub>1</sub>	3D275	Capacitor CA-275	Fixed, paper, 4.0 $\mu$ f, 50 v, d-c	Bypass capacitor			SC-D-512.
C <sub>2</sub>	3D193	Capacitor CA-193	Fixed, mica, 0.0005 $\mu$ f, 250 v, d-c	Blocking capacitor			SC-D-1993.
C <sub>3</sub>	3D277	Capacitor CA-277	Fixed, paper, 0.1 $\mu$ f, 400 v, d-c	Filter capacitor			SC-D-1995.
C <sub>4</sub>	3D353	Capacitor CA-353	Fixed, paper, 0.01 $\mu$ f, 400 v, d-c	Bypass capacitor			SC-D-1995.
C <sub>5</sub>	3D308	Capacitor CA-308	Electrolytic, 50 $\mu$ f, 25 v, d-c	Bypass capacitor			SC-D-2246.
C <sub>6</sub>	3D284	Capacitor CA-284	Fixed, paper, 0.05 $\mu$ f, 400 v, d-c	Oscillator tuning capacitor			SC-D-1995.
C <sub>7</sub>	3D374	Capacitor CA-374	Fixed, paper, 2.0 $\mu$ f, 800 v, d-c	Filter capacitor	C-D	TLA-0020	SC-D-4366.
D <sub>M1</sub>		Dynamotor DM-25	12 v input, 0.05 amp, 250 v output	Plate supply			
F <sub>1</sub>	3Z1921A	Fuse FU-21-A	10 amp, 25 v, 5 sec delay	Supply fuse			
L <sub>1</sub>		Transformer C-253	Primary resistance, terminals 1-3 and 4-6, 70 ohms max; turns ratio secondary winding to each primary winding 10 to 1.	Input transformer			SC-D-4365.
L <sub>2</sub>		Transformer C-256	Primary resistance, 210 ohms max; secondary resistance, terminals 3-7, 190 ohms max.	Output transformer			SC-D-4365.
L <sub>3</sub>		Transformer C-254	Primary resistance, terminals 1-2, 45 ohms max, terminals 2-3, 115 ohms max; secondary resistance, terminals 4-5, 215 ohms max.	Oscillator transformer			SC-D-4364.
L <sub>4</sub>		Coil C-279	Iron core, 10 heavy, 50 ms, 500 ohms max.	Filter choke			SC-D-4347.
R <sub>1</sub>		Resistor RS-242	Wire-wound, 100 ohms 8w	Dropping resistor			RL-D-6223.
R <sub>2</sub>		Resistor RS-244	Moulded, 350 ohms, 1w	Bias resistor			SC-D-970.
R <sub>3</sub>		Resistor RS-243	Wire-wound, 10,000 ohms, 8w	Dropping resistor			RL-D-6223.
R <sub>4</sub>		Potentiometer RS-239	Linear, 500,000 ohms	Gain control			SC-D-1982.
SW <sub>1</sub>		Socket	8 Prong, octal	Tube socket	American	MIPS.	SC-D-4187.
TB <sub>1</sub>		Switch SW-151	Toggle, DPST	Power switch			SC-D-4361-GR-2.
		Terminal strip	Phenolic plate, 14 terminals				

## c. Interphone amplifier BC-667.

Reference No.	Stock No.	Name	Description	Function	Manufacturer (See par. 12)	Manufacturer's part No.	Drawing Signal C.
C <sub>1</sub>	3D275	Capacitor CA-275	Fixed, paper, 4.0 $\mu$ f, 50 v, d-c.	Bypass capacitor.			SC-D-512.
C <sub>2</sub>	3D193	Capacitor CA-193	Fixed, mica, 0.005 $\mu$ f, 250 v, d-c.	Blocking capacitor.			SC-D-1993.
C <sub>3</sub>	3D277	Capacitor CA-277	Fixed, paper, 0.1 $\mu$ f, 400 v, d-c.	Filter capacitor.			SC-D-1995.
C <sub>4</sub>	3D353	Capacitor CA-353	Fixed, paper, 0.01 $\mu$ f, 400 v, d-c.	Bypass capacitor.			SC-D-1995.
C <sub>5</sub>	3D308	Capacitor CA-308	Electrolytic, 50 $\mu$ f, 25 v, d-c.	Bypass capacitor.			SC-D-2246.
C <sub>6</sub>	3D284	Capacitor CA-284	Fixed, paper, 0.05 $\mu$ f, 400 v, d-c.	Oscillator tuning capacitor.			SC-D-1995.
C <sub>7</sub>	3D374	Capacitor CA-374	Fixed, paper, 2.0 $\mu$ f, 600 v, d-c.	Filter capacitor.	C-D	TLA-6020.	SC-D-4366.
DM <sub>1</sub>		Dynamotor DM-45- ( ).	24 v input, 0.05 amp, 250 v output.	Plate supply.			
F <sub>1</sub>	3Z1921A	Fuse FU-21-A	10 amp, 25 v, 5 sec delay.	Supply fuse.	Littlefuse	Type 3 A. G. 10A.	SC-D-4365.
I <sub>1</sub>		Transformer C-253	Primary resistance, terminals 1-3 and 4-6, 70 ohms max; turns ratio secondary winding to each primary winding 10 to 1.	Input transformer.			
I <sub>2</sub>		Transformer C-255	Primary resistance, 210 ohms max; secondary resistance, terminals 3-7, 190 ohms max.	Output transformer.			SC-D-4365.
I <sub>3</sub>		Transformer C-254	Primary resistance, terminals 1-2, 45 ohms max, terminals 2-3, 115 ohms max; secondary resistance, terminals 4-5, 215 ohms max.	Oscillator transformer.			
I <sub>4</sub>		Coil C-279	Iron core, 10 henrys, 50 ma, 500 ohms max.	Filter choke.			SC-D-4364.
R <sub>1</sub>		Resistor RS-253	Wire-wound, 300 ohms, 10 w.	Dropping resistor.			RI-D-6223.
R <sub>2</sub>		Resistor RS-244	Molded, 350 ohms, 1 w.	Bias resistor.			SC-D-970.
R <sub>3</sub>		Resistor RS-243	Wire-wound, 10,000 ohms, 8 w.	Dropping resistor.			RI-D-6223.
R <sub>4</sub>		Potentiometer RS-239	Linear, 500,000 ohms.	Gain control.			SC-D-1982.
R <sub>5</sub>		Resistor RS-252	Wire-wound, 25 ohms, 10 w.	Dropping resistor.			RI-D-6223.
SW <sub>1</sub>		Socket	8 prong, octal.	Tube socket.	American	MIPS.	SC-D-4187.
RB <sub>1</sub>		Switch, SW-151	Toggle, DPST	Power switch.			SC-D-4361-GR-2.
		Terminal strip	Phenolic plate, 14 terminals				

## d. Control box BC-422.

Reference No.	Stock No.	Name	Description	Function	Manufacturer (See par. 12)	Manufacturer's part No.	Drawing Signal C.
J <sub>1</sub>	2Z5544	Jack JK-44	Two-terminal jack	Headset jack			SC-D-1585.
J <sub>2</sub>	2Z5543	Jack JK-43	Three-terminal jack	Microphone jack			SC-D-1585.
R <sub>6</sub>		Potentiometer RS-241	Wire-wound, linear 10,000 ohms	Volume control			SC-D-1982.
SW <sub>2</sub>		Switch SW-142	Toggle, DPDT	Interphone-radio switch			SC-D-4187.
SW <sub>3</sub>		Switch SW-142	Toggle, DPDT	Interphone-radio switch			SC-D-4187.
TRB <sub>1</sub>		Terminal block	Phenolic plate, 16 terminals				SC-D-4408.

## e. Control box BC-449.

J <sub>1</sub>	2Z5544	Jack JK-44	Two-terminal jack	Headset jack			SC-D-1585.
R <sub>6</sub>		Potentiometer RS-241	Wire-wound, linear 10,000 ohms	Volume control			SC-D-1982.
SW <sub>2</sub>		Switch SW-142	Toggle, DPDT	Interphone-radio switch			SC-D-4187.
SW <sub>3</sub>		Switch SW-142	Toggle, DPDT	Interphone-radio switch			SC-D-4187.
TM <sub>1</sub>		Terminal block	Phenolic plate, 16 terminals				SC-D-5735.

f. Jack box BC-378 or BC-678.

Reference No.	Stock No.	Name	Description	Function	Manufacturer (See par. 12)	Manufacturer's part No.	Drawing Signal C.
J <sub>1</sub>	225544	Jack JK-44	Two-terminal jack.	Headset jack.			SC-D-1585.
J <sub>2</sub>	225543	Jack JK-43	Three-terminal jack.	Microphone jack.			SC-D-1585.
		Jewel pilot light	Green pilot lens.		Radio	K6430	
		Jewel pilot light	Red pilot lens.		Radio	K6429	
LM <sub>1</sub>	225932	Lamp LM-33	12-16 v, G 4 1/2, bulb Mazda.	Red pilot light (BC-378 only).	Westinghouse	57	
LM <sub>2</sub>	225933	Lamp LM-33	12-16 v, G 4 1/2, bulb Mazda.	Green pilot light (BC-378 only).	Westinghouse	57	
LM <sub>3</sub>	225943	Lamp LM-43	24-28 v, G 4 1/2, bulb Mazda.	Red pilot light (BC-678 only).	Westinghouse	57	
LM <sub>4</sub>	225943	Lamp LM-43	24-28 v, G 4 1/2, bulb Mazda.	Green pilot light (BC-678 only).	Westinghouse	57	
		Socket, pilot light.	Bayonet base, G 4 1/2 bulb.	Pilot light socket.	Dial	707	
R <sub>6</sub>		Potentiometer RS-241	Wire-wound, linear, 10,000 ohms.	Volume control.			SC-D-1982.
SW <sub>4</sub>		Switch SW-152	Toggle, DPST.	Microphone switch.			SC-D-4187.
SW <sub>1</sub>		Switch SW-153	Push button, three circuit.	Signal switch.			SC-A-4376.
TB <sub>4</sub>		Terminal block	Phenolic plate, 12 terminals				SC-D-6268.

*g. Jack box BC-379.*

Reference No.	Stock No.	Name	Description	Function	Manufacturer (see par. 12)	Manufacturer's part No.	Drawing Signal C.
J <sub>1</sub>	2Z5544	Jack JK-44	Two-terminal jack	Headset jack			SC-D-1585.
J <sub>3</sub>	2Z5543	Jack JK-43	Three-terminal jack	Microphone jack (not wired).			SC-D-1585.
R <sub>6</sub>		Potentiometer RS-241	Wire-wound, linear, 10,000 ohms	Volume control			SC-D-1982.
TB <sub>6</sub>		Terminal block	Phenolic plate, six terminals				SC-D-4515.

<i>h. Jack box BC-448.</i>							
J <sub>1</sub>	2Z5544	Jack JK-44	Two-terminal jack	Headset jack			SC-D-1585.
J <sub>2</sub>	2Z5543	Jack JK-43	Three-terminal jack	Microphone jack			SC-D-1585.
J <sub>3</sub>	2Z5544	Jack JK-44	Two-terminal jack	Headset jack			SC-D-1585.
J <sub>4</sub>	2Z5543	Jack JK-43	Three-terminal jack	Microphone jack			SC-D-1585.
R <sub>6</sub>		Potentiometer RS-241	Wire-wound, linear, 10,000 ohms	Volume control			SC-D-1982.
TB <sub>6</sub>		Terminal block	Phenolic plate, six terminals				SC-D-4732.

## 12. Addresses of manufacturers.

American—American Phenolic Corporation	1250 Van Buren St., Chicago, Ill.
C-D—Cornell-Dubilier Electric Co.	South Plainfield, N. J.
Dial—Dial Light Company of America Inc.	136 Liberty St., New York, N. Y.
Littlefuse—Littlefuse Inc.	4757 Ravenswood Ave., Chicago, Ill.
Radio—Radio Wire Television Inc.	100 Sixth Ave., New York, N. Y.
Westinghouse—Westinghouse Electric Mfg. Co.	1180 Raymond Ave., Newark, N. J.

[A. G. 062, 11 (2-2-42).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,  
*Chief of Staff.*

## OFFICIAL:

E. S. ADAMS,  
*Major General,*  
*The Adjutant General.*

## DISTRIBUTION:

D 17(5); R 17(5); IBn 11 17 (2); IC 11 (10), 17 (5).  
(For explanation of symbols see FM 21-6.)

## NOTES



